

# The Potential of Electrodes

## Interview with Dr. Pegah Shakeri (Coatema Coating Machinery)



Dr. Pegah Shakeri

### **How does Coatema's coating machinery contribute to advancing electrochemical technologies, especially in case of electrochemical CO<sub>2</sub>-conversion? What unique capabilities or features does Coatema offer in this field? How do you plan to implement this expertise in the WaterProof project?**

Coatema offers unique capabilities in the field of electrochemical technologies through its expertise in upscaling production processes like gas diffusion electrodes (GDL) and developing electrode and interconnect materials thus plays a crucial role in advancing electrochemical CO<sub>2</sub>-conversion.

In the WaterProof project, Coatema is focusing on improving the carbon cycle of wastewater by developing innovative solutions. To this aim,

Coatema plans to design and develop tailored roll-to-roll line by upgrading the *Click&Coat* pilot line. This upgrade will facilitate the production of gas diffusion electrodes (GDL) at a larger scale, contributing to the project's goal of improving the carbon cycle of wastewater through innovative solutions. By leveraging their experience and technical resources, Coatema aims to advance electrochemical technologies for sustainable environmental impact.



Electrochemical Processes (Source: Coatema)

### **How does your *Click&Coat* technology contribute to the particularly rapid development/scale-up of special coatings for the WaterProof electrodes?**

Coatema's *Click&Coat* technology offers maximum modularity and flexibility, allowing for the rapid development and scale-up of special coatings for WaterProof electrodes. This revolutionary concept provides an endless number of process variants, enabling the configuration of the line to meet specific process requirements. *Click&Coat's* flexibility is evident in its interchangeable coating heads and downstream components that can be easily assembled to create customized inline processes. With over 30 different process modules available, *Click&Coat* offers a wide range of configurations that can be tailored to meet the most demanding performance and quality standards. This technology not only streamlines the electrode

coating process but also enhances efficiency, throughput, and the development of coating and lamination technology.

Coatema's *Click&Coat* technology significantly contributes to the rapid development and scale-up of special coatings for the WaterProof electrodes. This technology enables the design and development of an appropriate roll-to-roll line, crucial for upscaling the production of gas diffusion electrodes (GDL) in projects like WaterProof. By upgrading the *Click&Coat* pilot line, Coatema enhances the efficiency and precision of coating processes, facilitating the production of innovative solutions for improving the carbon cycle of waste water.

## **Could you elaborate on any recent breakthroughs or innovations in electrochemical CO<sub>2</sub>-conversion processes that have been achieved with the assistance of Coatema's electrode coating?**

Coatema's expertise and know-how in renewable energy technologies, including electrode manufacturing, ink/paste formulation and process control, has been instrumental in advancing these critical technical aspects of CO<sub>2</sub>-conversion systems.

Recent breakthroughs and innovations in electrochemical CO<sub>2</sub>-conversion processes have been achieved using Coatema's electrode coating technology, both in R&D projects and by providing machinery and technical process knowledge to the company's successful customers in this field.

One significant advancement is the development of highly efficient and selective electrocatalysts for CO<sub>2</sub> reduction (CO<sub>2</sub>R). These advancements have focused on improving the efficiency of CO<sub>2</sub>R processes through electrolyser configuration, electrode structure, electrolyte selection. By enhancing the design and engineering of the CO<sub>2</sub>R process, these innovations have paved the way for low-cost, large-scale CO<sub>2</sub>R electrolysers. Coatema's expertise in electrode coating plays a crucial role in these advancements by enabling the rapid development and scale-up of specialized coatings for electrodes used in electrochemical CO<sub>2</sub>-conversion processes.

## **Where do you see potential for future applications of your electrode coating technology?**

The potential for future applications of electrode coating technology, particularly in the context of dry coating processes, is vast and promising. One key area of application lies in the production of next-generation fuel cells, batteries for electric vehicles and energy storage systems. The potential for future applications of Coatema's electrode coating technology lies in various innovative fields. One significant area is the advancement of electrochemical technologies, particularly in the development of sustainable energy solutions like hydrogen production through solid oxide electrolytic cells (SOECs). Additionally, the utilization of electrode coating technology in projects like the IDEEL initiative for

laser drying processes in lithium-ion battery manufacturing showcases its potential for enhancing energy-efficient and environmentally friendly production methods. Moreover, the application of this technology in projects focusing on flexible plastic and paper surfaces, switchable films for energy-saving windows, and ink development for fuel cell catalyst coating highlights its versatility across different industries and applications. Overall, the future applications of Coatema's electrode coating technology are promising in driving forward sustainable energy production, battery manufacturing, and innovative surface technologies